Common Sense Initiative
Automobile Manufacturing Sector

U.S. Automobile Assembly Plants and Their Communities

Environmental, Economic and Demographic Profile

Part I: Database Description, Findings, and Recommendations

December 1997

Part I:

Database Description, Findings and Recommendations

December 1997

PART I: PROFILE DESCRIPTION, FINDINGS AND RECOMMENDATIONS

I-1 INTRODUCTION

This document presents information about automobile assembly plants in the United States and the communities in which they are located. A multi-stakeholder team ("Project Team") compiled it as a project of the Common Sense Initiative (CSI) for the Automobile Manufacturing Sector (see Appendix A for lists of the Auto Sector Subcommittee and Project Team members). CSI is a experiment to see if a diverse group of stakeholders in a given industrial sector can develop cleaner, cheaper, and smarter ways to protect the environment (see Appendix B for information about CSI). The CSI Project Team formed a multi-stakeholder "work group" to produce this data package (see Appendix C).

A compiled information base includes environmental, economic and demographic data. This variety reflects the team's desire to improve understanding by all stakeholders about sector-and community-related issues. In particular, the Project Team recognized that automobile manufacturing facilities operate within and as part of their communities, and so the report includes information about those communities.

The report is organized into three main parts. The first part, which is this section, provides background information. As with any effort of this type, important discussions of methodology direct the reader to consider data limitations. This part also presents condensed summaries of the data and some lessons learned while compiling the package.

The second part of the report contains sector-wide summaries of the raw data. For the purposes of this report as well as how CSI defined this sector, the universe of facilities was limited to automobile and light duty truck assembly plants. The third part of the report, which should interest assembly plant communities, provides local community and plant specific information. The report's appendices provide additional technical detail.

While the Project Team attempted to compile a breadth of relevant data, information sources were incomplete. By publishing this effort, the Project Team hopes to encourage a dialogue about which data are useful for characterizing an industry or a community and how this type of information can best be presented and used to meet the needs of various stakeholders.

I-2 OBSERVATIONS AND RECOMMENDATIONS

A key goal of this project was to compile publicly available economic, demographic and environmental data for auto assembly communities and for the auto assembly sector as a whole. Another goal was to examine how existing data resources could be used to support experiments in community-based and sector-wide environmental decision-making.

MAIN OBSERVATIONS

The Project Team found that existing data resources are not well suited to industrial sector-wide, single facility multi-media or community-wide assessments. The Project Team also found that the reviewed data bases were, to varying degrees, incomplete, inaccurate, not current or not easily accessible.

MAIN RECOMMENDATIONS

1. The EPA should explore ways to improve the viability, accessibility and usefulness of data resources. If other community-based or industry sector-based initiatives are undertaken, improved reporting formats, uses of data or presentations are needed and should involve industry, environmental groups, state and local governments and other stakeholders.

2. The EPA should take steps to address the problems of data accuracy, completeness and consistency that were identified by the Project Team.

DETAILED OBSERVATIONS

The following observations describe a number of challenges and difficulties encountered by the Project Team in compiling data on assembly plants and their communities. These observations provide the basis for the Project Team's recommendations.

Sector Definition

The Standard Industrial Classification system (SIC) is a logical starting place for defining a sector of interest and accessing data on that sector. If a sector is defined well by a single SIC or combinations of SICs, then collecting environmental and economic data will be relatively straightforward.

In many cases, however, SICs are too broad, capturing facilities with very different technical and economic characteristics. Where SICs do not provide a useful definition of a sector, data collection may require a plant-by-plant approach. Such a plant-by-plant approach may not be feasible if the sector in question is not extensively reported on (e.g., by trade associations and trade literature) and/or if the sector includes large numbers of small facilities (e.g., electroplating).

SICs 3711[1] and 3713[2] include vehicle body suppliers as well as assembly plants, and include heavy-duty trucks, buses and other vehicles as well as autos and light-duty trucks. For this project, therefore, the SIC categories were too broad for defining the sector of interest. EPA and industry sources were used to define the universe of plants in the sector. The primary EPA resource was the list of plants reporting to TRI for SICs 3711 and 3713 followed by a review to identify auto and LDT assembly plants. The primary industry resource was a list generated by AAMA and verified by company personnel. The Project Team also referred to published production data and obtained a final review by government and industry officials to ensure that the listed plants were currently operating (in 1995) assembly plants rather than parts suppliers or other types of facilities.

It was difficult in some cases to determine whether co-located plants should be treated as one or two plants, and what portions of a plant or facility complex should be included as "assembly." The TRI ID numbers were found to be the most consistent way to identify a facility, given inconsistencies across data sources in plant names, addresses, and plant status (operating versus temporarily or permanently closed). Even the TRI identifiers were not entirely consistent, however, because there is some variation in how companies report adjacent plants in the TRI program.

Temporal Considerations

The Project Team constructed a history of plant openings and closings over the time period of interest (1991-1994), and collected environmental data for plants that closed during the period. This effort was complicated because the operating status of plants changes with relative frequency. During the period of interest, several plants opened, closed, or closed temporarily to convert to producing a different vehicle or from assembly to a different manufacturing process. Plants also may temporarily shut down for various other reasons. The Project Team needed help from industry officials to distinguish temporary from permanent closings.

---

[1] "Motor Vehicles and Passenger Car Bodies"

[2] "Truck and Bus Bodies"

Normalization

The interpretation of trends is improved by distinguishing fluctuations in releases caused by changes in production levels from trends due to other factors (changes in production technology, pollution prevention, vehicle size, configuration, product mix, etc.). The Project Team collected annual production data (number of vehicles) for each assembly plant. Production data were generally available from published trade sources, but some special data collection by the American Automobile Manufacturers Association (AAMA) was required to provide data on a consistent basis over the time period of interest. Specifically, the published production data reported for 1992 and after were based on the calendar year while earlier data were based on a vehicle model year.

Having the production data allowed the Project Team to calculate normalized trends -- that is, trends in emissions or waste quantities generated per vehicle produced -- as well as aggregate trends. Calculation of trends in releases per vehicle produced provides a more consistent basis for measurement, but improvements may be possible to account for variability in vehicle sizes, configuration and product mix.

Sector Economic Data

Environmental data are generally reported by facility (source), but economic data generally are not. For example, data on production are publicly-reported by plant for the auto industry (though not for all industries), but data on employment and other economic data (e.g., profits) are not. Such data can often be obtained at the sector level, for sectors that can be defined by SIC codes, from Census and other government data sources. For the automobile/light-duty truck assembly sector, these SIC-based data sources were too inclusive and lack of facility-level economic data precluded building a sector-level economic profile from individual plant data (as was done with the environmental data).

Community Information

As a first step in developing plant-community profiles, the Project Team collected a limited set of data on local resident characteristics, local employment, and the assembly plant itself. EPA Region 4 collected three types of demographic data for this purpose (population minority percentage, income and education level). Then, to provide a more complete picture of auto plant community characteristics, the Project Team added other kinds of economic and demographic data -- e.g., manufacturing employment, median household income, and population age.

Economic and demographic data were more readily available by geographic units below the state level than were environmental data. A key issue in gathering such data was the choice between using standard geographic areas (Census units, counties and states) used in data bases versus collecting data for specially-designed areas (e.g., 3-mile circles around assembly plants). The latter approach allowed a more precise definition of a plant's immediate "neighborhood" but involved substantially more work.

Economic and demographic data for areas around plants (1-, 3- and 5-mile radius circles) were compiled by EPA Region 4. Sources of environmental releases in a 3-mile area around assembly plants were identified using the TRI data. Any environmental, demographic and economic data that are identified by location (e.g. latitude/longitude coordinates) can be aggregated into areas more relevant to a particular plant and community, using Geographic Information Systems (GIS) methods. Developing data for tailored geographic regions was complicated by inaccuracies in reported geographic location identifiers, as described later in this section.

Researchers may determine which information to include in a community profile in various ways. Like geographic scope, the decision will often depend on preference, convenience, capability and objectives. Likewise, the community definition itself (neighborhood, county, watershed, etc.) should reflect the objectives of each particular project.

Data Accessibility and Management

Currently, substantial environmental information is collected on individual plants that can be used to characterize facilities, industries and communities. EPA is working to improve data management through such efforts as the Facility Identifier Initiative and electronic data interchange (EDI). On-line access to the TRI database is good and improving rapidly and the data are available for purchase on CD-ROM. The TRI data management process provides a verification and update procedure to ensure the accuracy of data provided to the public.

Data Compilation

Substantial programming effort was involved to compile the information in the format provided in this document. To use the key data sources, users must have access to a computer with sufficient disk space, a modem with reasonable speed, and (in the case of the TRI CD ROM) a CD drive and sufficient memory to take advantage of these resources. Each database requires expertise on the database structure and definitions, on specific quirks in each data source, on the software needed to access and analyze the data, and on appropriate ways of interpreting the data.

The Project Team found that existing "preprogrammed formats" were insufficient for this effort. Extensive programming, using multiple databases, was required to produce some profile formats. Other databases required manipulation of the data using various database programs (e.g., Paradox, Access, Lotus or Excel) to produce other community and/or sector formats.

A major source of complexity in using the BRS and TRI data is multiple entries for some data items. The basic unit in the BRS data is the waste stream. Each waste stream may be identified by multiple waste codes, and may be managed by multiple methods at multiple facilities. The national BRS database is formatted in a number of "flat files" which contain different portions of the data and with identifiers that allow linking the data in different files for the same waste streams.[3] This requires programming effort, and can be a source of error. Similarly, the basic unit of reporting for the TRI data is a TRI chemical. For each chemical, submitters may report multiple off-site management methods and locations. Care must be taken to capture all off-site destinations to calculate quantities transferred off-site for different management methods accurately.

Interpretation and Technical Support

Certain misinterpretations or inappropriate uses of data may occur as data become more available to a wide range of users. For example, Project Team members expressed concern that presenting a single plant's contribution to an area's emissions inventory using TRI data may be misleading because of absent or incomplete information about the relative contributions of other sources.

The Project Team also expressed concern about the common practice of summing TRI releases and transfers from a specific source and inappropriate interpretation of the sum. Because transfers include recycling or other treatment to reduce further releases, they have very different implications for environmental impacts -- both in total and in location -- than do direct releases from plants. Totals for releases and transfers were reported separately in this document.

Good technical support should help prevent interpretive errors. In this project, the Project Team found the documentation of the technical aspects of the major databases (TRI and BRS) to be generally good. User support staff was also helpful in answering specific questions.[4] However, general guidance on the interpretation and use of the data was limited in most cases and did not exist for criteria air pollutant data.

[3] To create the profiles in this report, for example, data from "flat files" G1 and G2 was linked to line up waste codes with other waste descriptors. In addition, data from flat files G4 and G5 were linked to the G1/G2 data to characterize management practices for each waste stream. Care -- and sometimes observation-by-observation investigation -- was required to avoid double-counting quantities generated in the process of linking files. In addition, there were discrepancies between the various files, caused (sometimes) by data entry errors or (more often) by missing observations.

[4] Technical documentation includes copies of the reporting forms and instructions, and directions for accessing and manipulating the data.

Reporting Practices

In the RCRA biennial report data some plants listed less than ten separate waste streams and other plants reporting more than 70 individual waste streams. Given the similarity of the basic processes (e.g., painting) that generate wastes at assembly plants, this diversity may indicate differences in company data collection and reporting practices, as well as differences in waste characteristics. More investigation would have been needed to determine how these differences in reporting practices affect interpretation of the data.

Reporting practices also vary among states. For example, no BRS data on waste physical form or source were found in the national database for plants located in Ohio. In addition, states differ in the extent to which they require reporting on hazardous waste waters managed under the Clean Water Act in the biennial report system. These inconsistencies limit users' ability to calculate totals and make comparisons at the sector level.

Data Quality

The Project Team encountered some data quality problems in the course of its work. Appendices F and G describe the results of the data quality review process. In addition, the Project Team discovered a general error in the CD-ROM version of the TRI database. The data for releases and the totals for transfers are correct; however, the data on transfers by type of transfer (e.g., energy recovery, recycling, treatment and disposal) are not correct, due to a programming error. The EPA plans to correct this error on the CD-ROM containing the 1991-1995 data (to be published shortly).[5] For this document, the Project Team relied on EPA's in-house version of the database to compile data on transfers of TRI chemicals by type.

Data Completeness and Timeliness

Incomplete or out-of-date data were found to be a problem more often than incorrect data. Three national data sources in particular were found to be very incomplete or out-of-date:

AIRS: Data were missing in the national AIRS database for most facilities. The Project Team collected data for VOC and NOx emissions directly from the states, to fill in the gaps.

---

[5] The TRI data in EPA's version in-house of the TRI database and the National Library of Medicine TRI database (which is available on-line to the public) were not affected by this error. It has not yet been determined whether the version of the TRI data provided by RTKNet (a non-profit network) -- also available to the public -- are affected by the error.

Even with this effort, however, data were not available in all cases and care was needed to ensure that the states provided data on the same basis as AIRS (i.e., actual emissions rather than allowable).

PCS: This data base appeared incomplete regarding permit status for several plants. While this raised a number of questions, it was not followed up due to a combination of time limitations and issues of scope.

RCRIS: Similarly, this database appeared incomplete for similar reasons. As with the PCS, no further action was taken.

Definition of "Facility"

Collecting data from multiple sources for the same facilities was hindered by inconsistencies across data bases in the methods used to identify facilities. Obtaining EPA program-specific identification numbers for the active assembly plants was complicated by the fact that different names and addresses were sometimes used in reporting. Also, several facilities have plants close or adjacent to each other with different TRI and RCRA identification numbers. Regulatory variations in the definition of facility across programs complicated compilation of data and comparisons across plants.

Location Coordinates

Similarly, mapping environmental data was complicated by inconsistencies and inaccuracies in the location coordinates reported by facilities. Inaccurate or inconsistent location coordinates are becoming a more significant problem, as the use of these coordinates to prepare geographic presentations of data and to assess environmental impacts at the community level is increasing. The Project Team used the latitude and longitude coordinates adopted by EPA for its 1993 geographic TRI reports as a starting point. EPA has developed these "preferred coordinates" for cases where the coordinates reported by facilities in their TRI reports appear to be inaccurate. The Project Team reviewed EPA's preferred coordinates and found some cases where different coordinates appeared to be more appropriate. Changes in the coordinates used to compile data for areas around plants and to prepare maps were made only where there was a significant difference between EPA's preferred coordinates and those identified by the Project Team. [6]

EPA has made some changes to its quality review process, based on this review of coordinates for auto assembly plants, which has improved the accuracy of the location coordinates used for EPA's geographic TRI products. Continued review of EPA's methods for replacing

---

[6] Information on methods used to evaluate and correct location coordinates is provided in Appendix F of this document.

submitted coordinates with "preferred" coordinates is appropriate. Recognizing that there are limitations inherent in any automated review process, EPA might also consider methods for verifying the results of their quality review process, and working toward a standard set of coordinates for facilities. Confusion and potential for error would also be reduced by use of the same coordinates for all of EPA's databases (TRI, BRS, etc.).

RECOMMENDATIONS

Based on its experience compiling the data in this report, the Project Team recommends that EPA continue efforts in two directions to improve data support for future community and sector-based initiatives. These two efforts address the accessibility and usefulness of data on one hand, and the basic quality of data on the other. The Project Team recommends that industry, environmental groups and other stakeholders be involved in both efforts.

1. *The EPA should explore ways to improve the viability, accessibility and usefulness of data resources. If other community-based or industry sector-based initiatives are undertaken, improved reporting formats, uses of data or presentations are needed and should involve industry, environmental groups, state and local governments and other stakeholders.*

   The Project Team attempted to develop multimedia profiles which provided environmental, economic, and demographic data in both a community and industrial sector format. Substantial progress was made in this project compiling data in new formats. However, questions of data viability, accessibility and usefulness remain.

   More extensive guidance on use and interpretation of such resources is needed for appropriate use of data by a more diverse user community. For example, explicit warnings about potential double-counting errors that may result when using data elements with multiple observations per waste or chemical is needed.

   It would be impossible to define data and reporting formats that would meet all users' needs. Greater use of "relational databases" would better serve a full range of environmental analysis and inquiry. Access to such resources could be improved and technical support for users would help assure appropriate interpretation.

EPA publishes some summaries of the data (notably TRI and BRS).[7] In addition, the TRI database provides a small number of "preformatted" reports that can be used without special programming. However, many emerging uses are not well-served by these summaries and formats. EPA could develop additional report formats that users could access without special programming. This would improve the usefulness of data for community and sector-based initiatives. For example:

Plant/Source Profiles: Preformatted "profiles" for individual sources or plants, which included data from various data bases, could be developed. Such profiles might be accessed on-line with a user-friendly front end for selecting plants.

Area Profiles: Areas might be defined in different ways to support different uses, including fixed reporting boundaries (county, MSA, or ZIP code) and areas (e.g., 3- or 5-miles) around specific sources or environmental resources (located by lat/long coordinates).

2. *The EPA should take steps to address the problems of data accuracy, completeness and consistency that were identified by the Project Team.*

To the extent possible, a quality assurance/quality control process should be established where it currently is lacking. For example, the final BRS database is not corrected when errors are found by users. Maintaining a dynamic database presents certain problems. However, some errors are likely to remain hidden until the data are used, even if data entry forms have been quality controlled. It is therefore useful to have a mechanism for making corrections after the data are made available to users. The use of revised "Form Rs" to make corrections to the TRI data is a good model for this process.

In addition, EPA should develop a strategy to correct incomplete or out-of-date data. For example, lack of available VOC and NOx data in EPA's AIRS and state air program databases presented significant obstacles to summarizing a major environmental parameter for auto assembly plants.

EPA should also develop a strategy for improving the accuracy of location coordinates in various databases. For example, EPA could provide a map showing the location of each plant/source as identified by submitted latitude and longitude, and ask submitters to verify the locations.

[7] For example, totals by waste or chemical, totals by state, and a variety of "Top 10" lists.

Finally, EPA should review the various reporting requirements that are the source of much of the relevant data, and assess whether current methods for reporting, submitting and maintaining data are sufficient to make those data available and useful for community- and industry sector-based efforts. In particular, EPA should determine whether AIRS, PCS, RCRIS and other national databases can be better maintained and quality checked, so that the data being collected are more useful for a variety of purposes.

I-3 METHODOLOGY

Defining the Universe of Facilities

The first task of the work group was to define the universe of assembly plants to be covered by the data compilation. A decision was made early in the development process to include automobile and light duty truck assembly plants. The sector is loosely defined by the Standard Industrial Classification (SIC) codes 3711 and 3713. These codes also include truck, bus and other vehicle manufacturing and equipment suppliers, so by themselves they are too broad to define the universe. Thus, the group also used EPA and industry sources to produce a list of subject plants.

EPA used the SIC codes as reported to the Toxics Release Inventory (TRI) to produce an initial list of plants.[8] Other EPA data bases (AIRS, PCS, BRS and RCRIS) were also compared in an attempt to confirm this list.[9] Several identifiers were used in this process: plant name, address, data base identification number and geographic location identifiers (latitude and longitude). Each data base was found to identify plants differently, often resulting in multiple identifiers for single plants and significant inconsistencies among the data bases.

Independently, the American Automobile Manufacturers Association (AAMA) produced a list from its own published sources. In this process, information emerged about plants that were about to open, close or convert to different types of facilities; some definitional questions also started to appear. These issues are discussed below.

The two lists were then compared and consolidated, with another review of plant names, addresses and locations to help resolve discrepancies. This effort brought to light concerns regarding the accuracy of the latitude/longitude location identifiers and the methodology used to establish these numbers. Since the work group wanted to examine existing data from the community's perspective, the location of plants was a necessary data element. As a result of this finding, EPA is revising their approach for verifying location coordinates for plants with large acreage sites.

---

[8] TRI provides data on chemical specific release and transfers for all environmental media.

[9] AIRS is the Aerometric Information Retrieval System, which contains data on air emissions for criteria pollutants tracked under the Clean Air Act (CAA). PCS is the Permit Compliance System, which contains information about permitted releases to surface water under the Clean Water Act. BRS is the Biennial Reporting System, which contains hazardous waste reports under the Resource Conservation and Recovery Act (RCRA). RCRIS is the Resource Conservation and Recovery Information System, which identifies RCRA-permitted facilities.

At this point, industry representatives helped resolve two definitional problems. One situation involved two facilities that were located next door to each other, where one facility made a vehicle part that was supplied to the facility next door during the assembly process. The other situation involved a plant complex that passed partly assembled vehicles between two sections of the complex. The EPA data bases counted these plants differently, which had caused some confusion. The work group decided to count each situation as one assembly plant.

The final result was an agreed-upon list of 56 automobile and light duty truck assembly plants that were operating in the United States in early 1995. For this report, all plants were assigned numbers (1 through 56) that were used consistently throughout the report for identification purposes. For additional reference, the package also includes identity information derived from the EPA data bases reviewed -- regulatory program ID numbers and location identifiers (see the Part III profiles).

Determining the Universe for the Period 1991-1994

Since the work group also was interested in discerning data trends, it decided to examine data for the period beginning in 1991. Where possible, the group used 1994 as the base year because that was the latest year for which TRI data were available (at time of compilation). To develop a consistent basis, the group needed to know which plants were operating during that period and which changed operating status (permanently closed, temporarily closed, newly opened or converted). The work group was unable to locate a central or published source of information about changes in plant operating status, so it relied on a review of the EPA data bases and *Automobile News* production data. Through these, the group identified an additional set of plants that had operated between 1991 and 1994 but were closed by 1995. The work group spent less effort verifying this list up front than with the 1995 universe.

Normalizing environmental release data on some basis reduces some of the effects of activity level from other factors that can affect environmental data such as vehicle size, configuration, technology and pollution prevention efforts. The number of vehicles produced per year was the most easily obtained statistic for this purpose (although it has some limitations as a basis for normalizing, as noted in Section I-4). Two primary sources were used: *Automotive News* and *Ward's Automotive Reports*. Both of these are widely available and widely used resources.

Prior to 1992, plants reported production volume according to the model year of the vehicle. Beginning in 1992, most plants reported the data by calendar year. Since all the available environmental data had a calendar year basis, the production volumes had to have the same basis. Therefore, these data for 1991-1994 were checked and corrected as necessary.

Environmental Data

As noted above, the work group reviewed several existing EPA-managed air, water, hazardous waste and Toxics Release Inventory data bases for information relevant either to the assembly plant universe or the communities in which the plants are located. This information was compiled for both the sector as a whole and for individual communities. In addition to relevance, the work group examined the data bases for completeness and reliability. In general, the group reviewed only existing and publicly available national data sources, filling gaps on a case-by-case basis as feasible.

In part, the group wanted to demonstrate the availability, extent and quality of these types of sources on behalf of others who might attempt a project similar to this one. The group found that any interested party could reproduce this effort. Substantial investments of time, computer resources and skills were needed, however, to physically collect, format and, where possible, verify the data.

In keeping with the general goal of characterizing the auto sector environmentally, as a sector and within a community context, the group researched the data bases for pollutant releases. This information was provided by the AIRS, BRS and TRI data bases. For the years 1990-1994, AIRS provided varying amounts of data on emissions of ozone precursors (NOx and VOC). The data base was disappointing for its apparent incompleteness and slowness to update. The completeness of the database depends on timely data submission by the states to EPA. To fill gaps, an EPA consultant contacted state air pollution control agencies, with care taken to ensure that the same reporting basis was used throughout the compilation (i.e., actual emissions and not potential or allowable). The group did not attempt to collect data on emissions of other Clean Air Act criteria pollutants (SO2, CO, PM10, lead) from the states.

The BRS provided information about the amount of waste generated from RCRA-listed hazardous waste streams. Since this report is biannual, the group reviewed data for 1991 and 1993, the most recent years available.

As for the Permit Compliance System (PCS) and the Resource Conservation and Recovery Information System (RCRIS), the Project Team found little data relevant to this effort other than facility identification numbers.

Of all the data bases, the group found the TRI to best meet its criteria of accessibility, completeness, reliability and timeliness. The TRI reports data on the releases and transfers of several hundred listed chemicals.

The other side of the community's environmental picture is information about the ambient conditions where the plants are located. The group relied mostly on CAA attainment status for ozone, which may be rated as attainment for the ozone national ambient air quality standard, maintenance,[10] transition (from nonattainment to attainment), moderate nonattainment, serious nonattainment and severe nonattainment. Only a few plants are located in nonattainment areas for SO_2 and particulates.

Other information relevant to the quality of the environments surrounding assembly plants includes emissions from other nearby sources of pollution. TRI provided the most readily accessible, geographic-based data that could be used for this purpose, although TRI data are not complete because many sources are not covered by the TRI reporting requirements. The results are seen in Part III, where the community profiles are presented.

A major area not addressed in this effort was ambient environmental data (e.g., water quality monitoring data) for communities.

Compiling Community-Related Information

The work group considered recognition of the community information and data as an important element of the data package. Thus, this package attempted to create "profiles" of assembly plant communities by assembling data available for these locations.

A variety of approaches for selecting community boundaries, as suggested by EPA data bases and other resources, were considered. EPA maintains air quality information on the basis of Air Quality Control Regions, which may encompass several counties or parts of counties. "Census tracts," which are defined to include between 2,500 and 8,000 residents, are generally smaller than counties. County data are routinely used in both environmental and non-environmental data resources. The size and shape of all these geographic units can vary considerably.

While considering these, the work group became aware that any geographic unit definition will present some technical nuances and limitations. In addition to using these standard reporting units, the group used an approach based on uniform, circular, user-defined areas around assembly plants. Such areas can be defined for any size using computerized Geographic Information Systems (GIS) software. EPA Region 4 also was able to compile census and demographic data on this basis. This approach, which depends on the accuracy of the latitude and longitude coordinates, can lead to a more tightly defined area around a given plant. Of those data bases examined by the work group, most of the environmental data bases use latitudes/longitudes as plant location identifiers while most non-environmental resources are reported by census categories or counties.

[10] Recently reclassified as attainment and required to have maintenance plans with contingency measures.

Economic Data

For context about the industry as well as enhancing the plant-community link, the work group found that current plant-specific economic data, such as employment levels or local taxes, often are considered sensitive information or simply are not generally available. Rather, current data are published in aggregate form, such as on a state-wide basis. Older information may be available but are not routinely or centrally maintained. For this sector, AAMA obtained employment data for 1994 and Chrysler provided data for earlier years. Obtaining data for all plants for previous years would have required significant additional effort.

A large amount of published statistics about the industry are readily available, although not on a plant specific basis. The work group decided to include some of these published statistics for background.

Demographic Information

To further characterize assembly plant communities, the work group decided to include demographic and economic data, including population and population density, race and ethnicity, age characteristics, educational attainment, income and poverty status, and employment characteristics and unemployment rate.

Data Quality Issues

Efforts have been made to ensure that the data presented here are accurate. The work group, however, could not independently verify the data's accuracy in all cases. When errors were discovered, the group corrected the appropriate table and notified the EPA data manager where appropriate. (See Appendix G for a description of the data quality review.) Generally, however, the data in this package are derived from those that were originally reported to the government.

I-4 SUMMARY OF DATA AND GUIDELINES FOR USE

General Guidelines

The data in this document provide a multi-faceted picture of assembly plants and their communities. It is important to keep several general principles in mind to avoid mis-using or misinterpreting the data. The issues noted below include only those that sector participants identified, so the list may be incomplete.

First, the current releases presented in this report may represent only a portion of the sources of contamination in a local area. Past activities in a community may have contributed substantially to current soil, groundwater, and surface waters conditions. This is especially true of industrial and agricultural activities that occurred prior to the implementation of modern environmental regulations starting in the late 1970s.

In addition, the non-auto emission sources shown in the report were identified only through one data base, the TRI. Other current sources may exist in an area that are not required to report to TRI for various reasons and may or may not be represented in other EPA data bases. These sources may fall under the TRI threshold, they may have non-TRI-listed releases, or they may not be among the list of activities required to file reports. The work group did not review EPA's other data bases or other possible data sources to compile a comprehensive listing of these other sources. Significant sources of pollution in a given area may include non-manufacturing, non-commercial or non-agricultural sources, such as everyday human activities and biogenic processes.

Second, environmental releases from assembly plants depend heavily on the activity level of the facility. Changes in production level and product mix over time at individual plants greatly influence trends in environmental releases. The painting operation is a major source of environmental releases, and the amount of painting depends on the number of vehicles produced and on the size and configuration of those vehicles, in addition to other factors. In an attempt to normalize the data for this effect, the work group used production data in Section I-4 to assess release trends. Some data were analyzed separately for automobile and light duty truck assembly plants, but it was not possible to normalize the data to remove the effect of vehicle size (or configuration) on environmental releases.

Third, changes in the universe of assembly plants affect aggregate environmental trends at the industry level. To assess aggregate trends for the entire sector, it would be necessary to include data on plants that operated between 1991 and 1994 but that were not included in the universe of 56. The analysis of changes over time includes only the assembly plants included in the universe of 56 plants. Because plants opened and closed during the time period covered, the analysis of aggregate trends for these 56 plants will under- or over-state changes for the sector as a whole.

Fourth, care must be taken to distinguish true changes in environmental releases from apparent changes, such as those caused by different reporting requirements or practices, changes in the scope of reporting requirements (e.g., added or delisted chemicals or wastes), changes in the applicability of a reporting requirement, changes in the definition of facility or source, or other changes in the underlying definitions.

Even after considering these issues, other factors can affect a plant's environmental profile. These factors include, for example, plant age, process equipment age, vehicle size and configuration, on-site parts production, the type of painting and other processes used, and the range of assembly tasks performed at the plant. Some plants are highly-integrated, performing some parts and all assembly steps in-house. Others obtain parts from other manufacturing facilities. In addition, plants located in nonattainment areas are subject to different limitations on criteria pollutant air emissions than plants located in attainment areas or in or near Clean Air Act Class I ("pristine") areas. New plants, modifications or expansions are subject to certain additional requirements that older, unchanged plants do not face. Differences in the environmental characteristics of plants (e.g., in total releases, waste generation and releases/generation per vehicle produced) therefore often reflect the effects of physical and legal factors rather than particular management decisions.

The following sections describe the individual data sources used for this report, including guidelines for interpreting the data that are specific to each source, and summarize the data.

Overview of U.S. Motor Vehicle Manufacturing

The following data are taken from the American Automobile Manufacturers Association publication *Motor Vehicle Facts and Figures 1996*. These data provide an overview of the U.S. motor vehicle manufacturing industry. The scope of these data is somewhat broader than the 56 assembly plants discussed elsewhere in this document, because they include manufacture of larger trucks as well as manufacture of automobiles and light duty trucks. In addition, these data are for calendar year 1995. The data compiled specifically for this report generally cover only 1991 through 1994. The data in this section, while not directly comparable to the data compiled for this report, provide a useful current overview of the motor vehicle manufacturing sector as context. These data were not included in the data summaries provided in later parts of this section or in the Part II and Part III data tables.

Table I-1 shows U.S. production of all motor vehicles from 1930 through 1995. These data include automobiles, trucks, and buses, and are taken from *Ward's Automotive Reports* and AAMA data.

Table I-1

ANNUAL U.S. MOTOR VEHICLE PRODUCTION

Year	Passenger Cars	Commercial Vehicles	Total
1995	6,350,367	5,634,724	11,985,091
1994	6,613,970	5,648,767	12,262,737
1993	5,981,046	4,916,620	10,897,666
1992	5,664,203	4,064,587	9,728,790
1991	5,438,579	3,371,942	8,810,521
1990	6,077,449	3,705,548	9,782,997
1989	6,823,097	4,050,935	10,874,032
1988	7,113,137	4,100,550	11,213,687
1987	7,098,910	3,825,776	10,924,686
1986	7,828,783	3,505,992	11,334,775
1985	8,184,821	3,467,922	11,652,743
1984	7,773,332	3,151,449	10,924,781
1983	6,781,184	2,443,637	9,224,821
1982	5,073,496	1,912,099	6,985,595
1981	6,253,138	1,689,778	7,942,916
1980	6,375,506	1,634,335	8,009,841
1979	8,433,662	3,046,331	11,479,993
1978	9,176,635	3,722,567	12,899,202
1977	9,213,654	3,489,128	12,702,782
1976	8,497,893	2,999,703	11,497,596
1975	6,716,951	2,269,562	8,986,513
1974	7,324,504	2,746,538	10,071,042
1973	9,667,152	3,014,361	12,681,513
1972	8,828,205	2,482,503	11,310,708
1971	8,583,653	2,088,001	10,671,654
1970	6,550,128	1,733,821	8,283,949
1969	8,224,392	1,981,519	10,205,911
1968	8,848,620	1,971,790	10,820,410
1965	9,335,227	1,802,603	11,137,830
1960	6,703,108	1,202,011	7,905,119
1955	7,950,377	1,253,672	9,204,049
1950	6,628,598	1,377,261	8,005,859
1945	83,786	701,090	784,876
1940	3,728,491	784,404	4,512,895
1935	3,252,244	694,690	3,946,934
1930	2,784,745	571,241	3,355,986

Source: American Automobile Manufacturers Association, *Motor Vehicle Facts and Figures, 1996*, and *Ward's Automotive Reports*.

Production of automobiles and other vehicles, along with production of replacement parts, accounts for a significant portion of total U.S. consumption of major materials, including aluminum, lead, copper, zinc, steel and iron, as shown in Table I-2. A significant portion of these materials are from post-consumer recycled sources, and the industry is seeking to increase the recycled content and the recyclability of its products.

Table I-2 MATERIAL USAGE BY THE AUTOMOTIVE INDUSTRY, 1995		
Material	**Automotive Consumption**	**Automotive as Percent of Total U.S. Consumption**
Aluminum (thous lbs.)	4,926,000	27.1%
Copper and Copper Alloy (thous lbs.)	7,651,000	10.9%
Cotton (480 lb. bales)	11,292,000	0.1%
Total Iron (tons)	3,515,000	33.5%
Lead (metric tons)	1,088,070 e	68.1% e
Plastic (thous lb.)	3,054,670	4.3% e
Rubber (Natural & Synthetic)* (metric tons)	2,030,002	63.9%
Total Steel** (tons)	14,623,389	15.0%
Zinc* (tons)	1,190,000	23.0%

e = estimate
NA = not available
* includes rubber classified as "tire" and "tire products" only.
** automotive consumption of steel in understated as shipments to the automotive market from steel centers and distributors are excluded. Data also exclude imports.
NOTE: For most materials listed, automotive consumption includes materials for cars, trucks, buses and replacement parts.
SOURCE: American Automobile Manufacturers Association, *Motor Vehicle Facts and Figures*, 1996, from various sources.

The following figure, reproduced from AAMA's *Motor Vehicle Facts and Figures 1996*, shows that a substantial portion of a vehicle's material content is typically recovered.

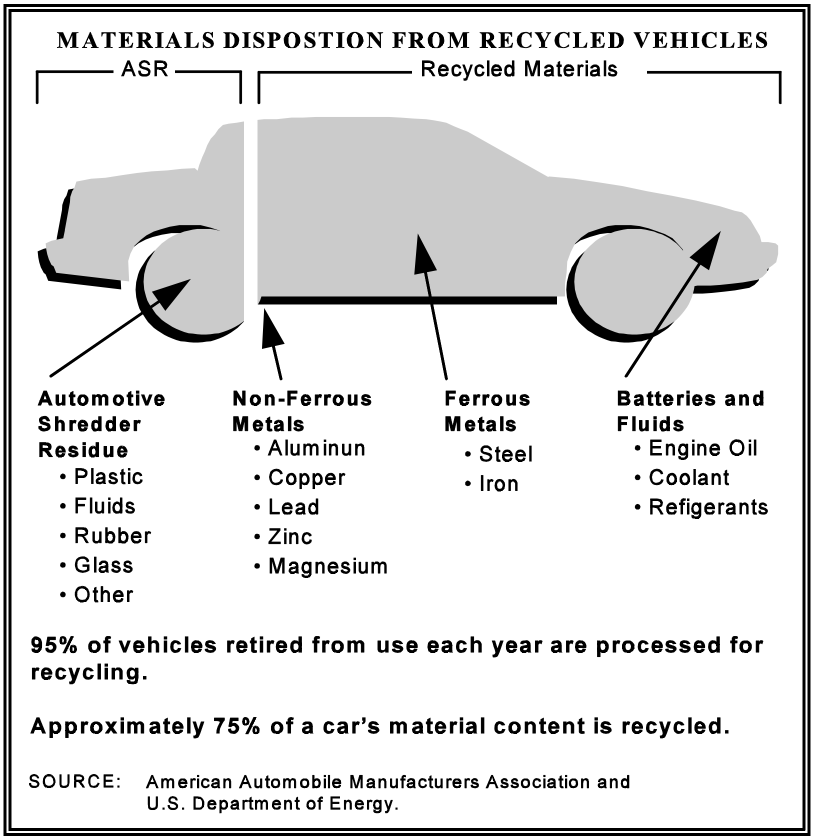


Table I-3 shows personal income of motor vehicle and equipment manufacturing employees from 1992 through 1994 in millions of dollars and as a percent of total personal income of all manufacturing employees. These data are calculated by AAMA based on data from the U.S. Department of Commerce, Bureau of Economic Analysis. The data include employees of auto, truck and bus producers and their immediate suppliers, and show that the sector as a whole accounted for seven percent of total U.S. manufacturing employee earnings in 1994.

Table I-3

PERSONAL INCOME OF MOTOR VEHICLE AND EQUIPMENT MANUFACTURING EMPLOYEES

	1992	**1993**	**1994**
Motor Vehicle & Equipment Manufacturing Employees: Personal Income (mill $)	$43,847	$45,470	$52,148
All Manufacturing Employees: Personal Income (mill $)	$692,808	$709,567	$747,552
Motor Vehicle & Equipment Manufacturing as Percent of Total Manufacturing	6.3%	6.4%	7.0%

Source: AAMA *Motor Vehicle Facts and Figures 1996*, from U.S. Department of Commerce data.

Description of Assembly Plant Universe

Automobiles and light duty trucks were assembled at 56 plants in the United States in 1995 -- 28 plants produced autos, 21 plants produced light duty trucks, one plant produced both light duty and heavy duty trucks, and six plants produced both autos and light duty trucks. Of the 56, 47 plants were operated by domestic automakers (General Motors, Ford and Chrysler) and six were operated by foreign-owned "transplant" companies (Toyota, Nissan, Honda (2 plants), Mitsubishi (Diamond-Star Motors), and BMW). Another three plants were operated as joint ventures.[11]

In the period 1991 through 1994, six plants closed or were converted to non-assembly operations and three plants opened. Appendix J lists plants that operated between 1991 and 1994 that were not included in the universe of 56 plants. The following shows the number of plants operating and the total production of autos and LDTs in each year from 1991 through 1994:

Table I-4

AUTOMOBILE AND LIGHT DUTY TRUCK ASSEMBLY PLANTS: NUMBER OF PLANTS OPERATING AND PRODUCTION

Year	Number of Plants	Production		
		Automobiles	LDTs	Total
1991	60	5,411,530	3,252,723	8,664,253
1992	57	5,609,702	3,885,851	9,495,553
1993	57	6,041,560	4,734,539	10,776,099
1994	57	6,769,575	5,411,441	12,181,016

Source: Part II, pages II-12, II-14, II-16, II-18, Appendix J, and AAMA.

[11] The joint ventures are: New United Motor Mfg., Inc. (NUMMI), jointly owned by General Motors and Toyota and producing autos at one plant in California; Subaru-Isuzu Automotive Inc., jointly owned by Fuji Heavy Industries Ltd. and Isuzu Motors LTD. and producing autos and LDTs at one plant in Indiana; and AutoAlliance International Inc., jointly owned by Ford and Mazda and producing autos at one plant in Michigan.

Toxics Release Inventory

Description and Guidelines for Use

The Toxics Release Inventory (TRI) was the most extensively used data source in this document. TRI data were compiled both for the assembly plants and for other TRI reporters located in the same areas. This data source is accessible to the general public, is widely cited and used, provides a multi-media perspective on the reporting facilities and covers many toxic pollutants.

The Toxics Release Inventory is mandated by the Emergency Planning and Community Right-to-Know Act (EPCRA) of 1986, which required certain manufacturing facilities to report their annual environmental releases (routine and accidental) of over 330 chemicals and chemical categories in 1994. Affected facilities are those with ten or more employees that manufacture or process more than 25,000 pounds or use more than 10,000 pounds of a TRI chemical in the calendar year.

In addition, affected facilities must report transfers of these chemicals off-site for energy recovery, recycling, treatment, and disposal. Treatment includes transferring wastewater for treatment at Publicly Owned Treatment Works (POTWs). It is important to remember that off-site transfers do not necessarily represent entry of the chemical into the environment, either in the assembly plant community or elsewhere.

The TRI data base is constructed to allow users to sort the data by chemical, plant or specified geographic area. The work group used this latter capability to collect data on releases from all reporting sources within a three mile radius of each assembly plant, to help put the assembly plant's contribution to local TRI releases in context.

The following characteristics of the TRI data should be considered when comparing data across individual reporters and assessing trends over time:

- The data may be based on best engineering estimates, as well as on actual measurement of releases. Sometimes, engineering estimates are the only way to determine a release or transfer amount. Methods used to estimate releases and transfers may differ across facilities and may change over time.

- Some otherwise subject facilities need not report to the TRI if they do not meet the various reporting thresholds. Other potential sources of TRI releases in a given area that TRI does not cover include many other industrial, commercial and institutional facilities such as power plants, airports, transportation companies, construction companies, laboratories, agriculture and municipal landfills.[12] Federal facilities were required to report starting in 1995, and therefore were not included in the data for earlier years.

- The chemicals listed under TRI have changed over time, and chemical coverage was greatly expanded for the 1995 reporting year, which this report does not include. These changes require adjustments when assessing trends in releases and transfers, to ensure a consistent basis over time. Changes in the coverage of chemicals reported by assembly plants between 1991 and 1994 are discussed in Appendix D. Changes in reporting requirements were also required by the Pollution Prevention Act of 1990, as described in Appendix D.

- TRI reports show only total annual releases and transfers of chemicals. Information on variations in chemical release rates over a shorter than annual timeframe is not provided by TRI.

- The chemicals listed under the TRI exhibit varying levels and types of toxicity, and their impacts will depend greatly on the level, duration, frequency, physical form and route of exposure. In addition, some chemicals may present more risk when present in one environmental medium than in another (e.g., air versus water).

- Many of the TRI chemicals reported by assembly plants are volatile organic chemicals and are included in VOC data described below. Not all TRI chemicals are VOCs and not all VOCs are listed as TRI chemicals. However, the two datasets overlap, and should not be summed.

- Because the TRI data base fails to cover all sources of releases and all compounds, considering only TRI data for a given community may mislead as to the relative contribution of auto assembly plants and their neighboring TRI facilities to the area's total releases.

Data reported under TRI Section 8, which provides information on source reduction and recycling of TRI chemicals, were not used. These data are incomplete, since reporting is not mandatory, and inconsistent across facilities, since each facility chooses its own basis for reporting production ratios.

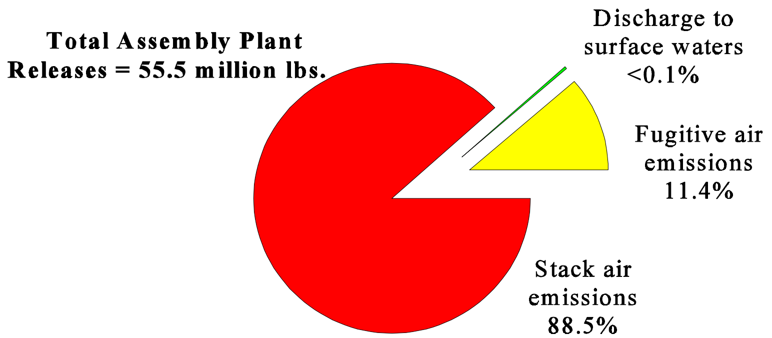
[12] In 1996, EPA proposed to expand the TRI reporting requirements to include selected non-manufacturing sectors.

Summary of Data

<u>1994 Snapshot</u>

In 1994, the largest portion of the TRI chemicals released by assembly plants were emitted to the air (55.5 million lbs.), of which 49.1 million lbs. (88.5 percent of total releases) were emissions from stacks (point source) and 6.3 million lbs. (11.4 percent of total releases) were fugitive emissions (from sources other than stacks). Direct discharges to surface waters represented less than 0.1 percent of total TRI releases. There was no direct on-site disposal to land or underground injection of TRI chemicals by assembly plants. (See Figure I-1)

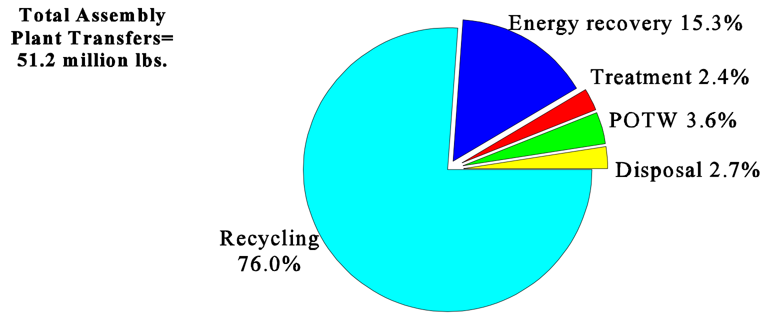
Figure I-1
1994 TRI RELEASES FROM AUTOMOBILE AND LIGHT DUTY TRUCK ASSEMBLY PLANTS BY TYPE OF RELEASE



Source: Part II, pages II-18-19.

Transfers of TRI chemicals off-site, including discharges to publicly-owned treatment works (POTWs), were primarily for materials recycling. Transfers for recycling (38.9 million lbs.) accounted for 76 percent of total transfers and transfers for energy recovery (7.9 million lbs.) accounted for another 15 percent of total transfers. POTW and other treatment and disposal together accounted for 9 percent of total transfers off-site. (See Figure I-2)

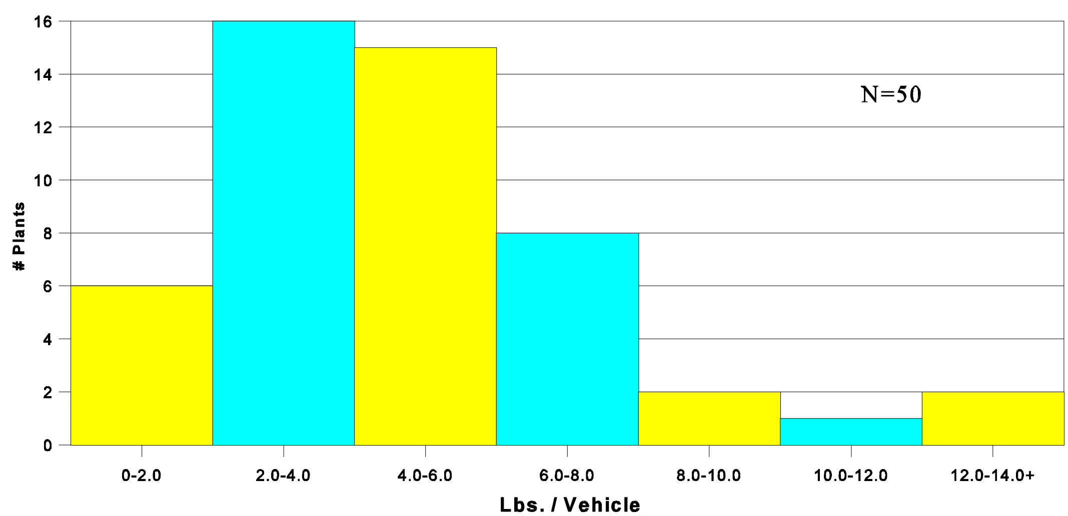
Figure I-2
1994 TRI TRANSFERS FROM AUTOMOBILE AND LIGHT DUTY TRUCK ASSEMBLY PLANTS BY TYPE OF TRANSFER



Source: Part II, pages II-18-19.

TRI air emissions per vehicle produced in 1994 show substantial variation across plants. (See Figure I-3). Auto assembly plants emitted an average of 4.9 lbs. per vehicle produced (with a range of 0.9

Figure I-3
DISTRIBUTION OF AUTOMOBILE AND LIGHT DUTY TRUCK ASSEMBLY PLANTS BY TRI AIR EMISSIONS PER VEHICLE PRODUCED, 1994



Excludes plants sharing production and plants not in production in 1994.
Source: Part II, pages II-4-11.

to 11.9 lbs. per vehicle), and light duty truck plants emitted an average of 4.8 lbs. per vehicle produced (with a range of .9 to 14.1 lbs.). Plants producing both automobiles and light duty trucks emitted an average of 4.5 lbs. per vehicle (with a range of 1.7 to 6.4 lbs.) Differences in emissions per vehicle among plants may be due to production of different sizes and configuration of vehicles (requiring different amounts and types of paint), variations in product mix, and variations in production technologies (e.g., painting methods), use of emission controls, and pollution prevention efforts.

Tables I-5 and I-6 show the quantities of the top ten TRI chemicals released (to air or surface waters) by assembly plants in 1994, and the top ten TRI chemicals transferred off-site by assembly plants for POTW treatment, energy recovery, recycling, other treatment or disposal, respectively. The top 10 chemicals or chemical groups account for 97 percent of total assembly plant releases and 89 percent of total assembly plant transfers of TRI chemicals. All but one of the top 10 chemicals are considered volatile organic chemicals, and are therefore also included in the VOC data reported below.

Table I-5
TRI CHEMICALS RELEASES FROM AUTOMOBILE AND LIGHT DUTY TRUCK ASSEMBLY PLANTS, 1994 (lbs. and percent of total)

TRI Chemical	Fugitive Air Emissions	Stack Air Emissions	Water	Total Releases	Percent of Assembly Plant TRI Releases
XYLENE (MIXED ISOMERS)	1,927,142	19,141,652	0	21,068,794	38.0%
GLYCOL ETHERS	607,448	6,573,627	10	7,181,085	12.9%
METHYL ISOBUTYL KETONE	518,824	6,315,559	10	6,834,393	12.3%
N-BUTYL ALCOHOL	246,704	4,414,177	0	4,660,881	8.4%
TOLUENE	662,708	3,099,935	0	3,762,643	6.8%
ETHYLBENZENE	213,454	2,889,177	0	3,102,631	5.6%
METHANOL	429,133	2,368,971	0	2,798,104	5.0%
1,2,4-TRIMETHYL-BENZENE	220,984	1,870,614	0	2,091,598	3.8%
METHYL ETHYL KETONE	668,596	1,072,582	0	1,741,178	3.1%
1,1,1-TRICHLORO-ETHANE	482,093	239,826	0	721,919	1.3%
All Others	369,495	1,127,514	9,842	1,506,851	2.7%
Total-All Assembly Plant Releases	**6,346,581**	**49,113,634**	**9,862**	**55,470,077**	**100.0%**

Source: Part II, p. II-3 and Part III profiles.

Table I-6 TRI CHEMICALS TRANSFERRED FROM AUTOMOBILE AND LIGHT DUTY TRUCK ASSEMBLY PLANTS, 1994 (lbs. and percent of total)							
Chemical	**POTW**	**Energy Recovery**	**Recycling**	**Treatment**	**Disposal**	**Total Transfers**	**Percent of Total Assembly Plant Transfers**
XYLENE (MIXED ISOMERS)	2,791	4,226,933	15,657,528	161,542	15,597	20,064,391	39.2%
METHYL ISOBUTYL KETONE	21,491	707,051	9,451,839	24,132	8,650	10,213,163	19.9%
ETHYLBENZENE	416	808,571	3,491,715	7,791	8,783	4,317,276	8.4%
GLYCOL ETHERS	1,602,985	210,415	554,290	66,541	53,255	2,487,486	4.9%
TOLUENE	862	257,719	1,898,809	97,271	1,227	2,255,888	4.4%
METHYL ETHYL KETONE	982	197,074	1,371,619	24,174	1,259	1,595,108	3.1%
MANGANESE	0	0	1,502,000	0	39,180	1,541,180	3.0%
N-BUTYL ALCOHOL	12,118	269,441	986,797	141,256	3,261	1,412,873	2.8%
METHANOL	18,273	373,667	372,319	38,936	4,559	807,754	1.6%
1,2,4-TRI-METHYL-BENZENE	1,216	196,401	602,226	6,237	609	806,689	1.6%
All Others	179,815	613,817	3,006,482	680,002	1,244,569	5,724,685	11.2%
Total-All Assembly Plants	**1,840,949**	**7,861,089**	**38,895,624**	**1,247,882**	**1,380,949**	**51,226,493**	**100.0%**
Source: Part II, p. II-3 and Part III profiles.							

TRI Trends 1991-1994

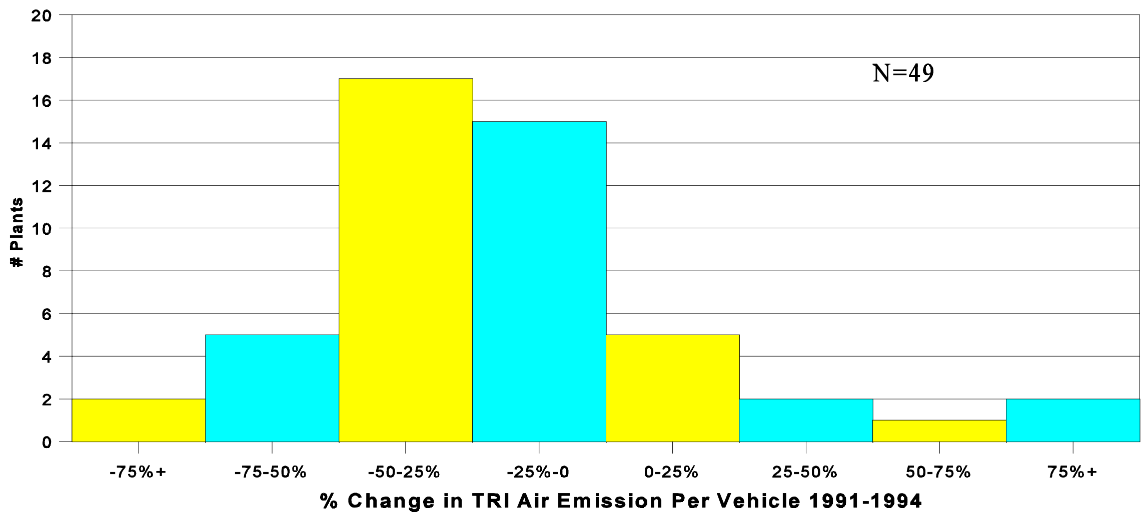
TRI data reported in Parts II and III show all TRI chemicals reported in each year, including chemicals that were subsequently delisted. All TRI trend analyses in this section incorporate adjusted TRI data that reflect a common list of TRI chemicals. That is, chemicals added or removed from the required TRI reporting list since 1991 are not included in these analyses. For assembly plants, the only relevant changes in the coverage of chemicals were for acetone and butyl benzyl phthalate, which were deleted from the list of TRI chemicals for the 1994 reporting year. These two chemicals have been eliminated from the data used to calculate changes between 1991 and 1994.

Total TRI releases from the 56 assembly plants operating increased by 11.8 percent between 1991 and 1994. Over the same period, vehicle production increased by 43.7 percent, resulting in a 22.2 percent decrease in total TRI releases per vehicle produced.

Total transfers of TRI chemicals from assembly plants to off-site locations increased 13.7 percent between 1991 and 1994 in the aggregate (45.1 million lbs. in 1991 and 51.2 million lbs. in 1994) (See Page II-3). With the increase in vehicle production, transfers per vehicle declined by 20.9 percent between 1991 and 1994.

Between 1991 and 1994, 39 plants reduced TRI releases per vehicle produced, and 10 plants increased average TRI releases per vehicle produced. Figure I-4 shows the distribution of percentage changes in TRI air emissions per vehicle between 1991 and 1994.

Figure I-4
DISTRIBUTION OF AUTOMOBILE AND LIGHT DUTY TRUCK ASSEMBLY PLANTS BY PERCENTAGE CHANGE IN TRI AIR EMISSIONS PER VEHICLE PRODUCED, 1991-1994



Excludes plants sharing production and plants not in production in 1991 or 1994.
Source: Part II, pages II-4-11.

Table I-7 shows the numbers of assembly plants increasing both releases and transfers, decreasing both releases and transfers, and increasing one while decreasing the other -- both in total and on a per vehicle basis. This table shows that a substantial portion of the assembly plants (27 of 49) reduced both TRI releases and TRI transfers on a per vehicle basis between 1991 and 1994. Increases in transfers may be the result of more material recycling or energy recovery.

Table I-7
NUMBER OF AUTOMOBILE AND LIGHT DUTY TRUCK ASSEMBLY PLANTS BY DIRECTION OF CHANGE IN TRI RELEASES AND TRANSFERS 1991-1994

	Total	**Per Vehicle***
Increased both releases and transfers	21	4
Decreased both releases and transfers	13	27
Increased releases, decreased transfers	13	6
Decreased releases, increased transfers	8	12
Total	**55**	**49**

Excludes plants sharing production and plants not in production in 1991 or 1994.
Source: Part II p. II-4-11.

RCRA Biennial Report System (BRS)

Description and Guidelines for Use

The Biennial Report is implemented under the Resource Conservation Recovery Act of 1976, as amended (RCRA). All non-household large-quantity generators (producers) of hazardous wastes and hazardous waste treatment, storage and disposal facilities (TSDFs) must submit a report every other year on the quantities of hazardous waste generated and the ways in which the wastes are managed. The Biennial Report requirements began in 1981 and the RCRA waste minimization program dates back to 1985. This CSI package contains BRS data from each of the assembly plants only for the reporting years 1991 and 1993 (the latest year for which data were available to the work group).

BRS data cannot be compared with TRI data because they measure different things. The BRS data represent whole waste streams, which may include mixtures of water and non-hazardous components as well as hazardous constituents. TRI data, by contrast, measure only the specific chemicals that are contained in waste, emitted to air, or otherwise released or transferred.

The following factors should be considered when using the BRS data:

- BRS covers wastes defined as "hazardous" by federal regulation. The scope of the federal hazardous waste definition has evolved over time, which complicates analysis of trends in waste generation.[13] However, no major changes in the hazardous waste definition occurred between 1991 and 1993 that affected the quantities reported by assembly plants.

- Generators who produce small quantities of hazardous waste per year (1000 kg. (2,200 lbs.) or less generated per month)[14] need not submit reports. In addition, wastes generated by households are excluded from the hazardous waste definition.[15] Therefore, the BRS data base does not capture all the hazardous wastes that may be generated or managed in a particular area.

---

[13] Additional wastes have been defined as hazardous by the expanded toxicity characteristic (effective in September 1990) and by specific waste listings. EPA has also proposed a rule that may exempt certain wastes containing very low concentrations of toxic constituents from the hazardous wastes requirements in the future (the "Hazardous Waste Identification Rule.").

[14] Lower reporting quantity limits apply for a subcategory of hazardous wastes regulated as "acutely hazardous wastes."

[15] Household and small quantity generator waste may end up in the local municipal landfill.

- States differ in how they define hazardous waste and how they treat recycled wastes and small quantity generators. RCRA requires states to have programs at least as stringent as the federal requirements, but some states go further and define additional wastes as hazardous. In addition, states differ in whether they require reporting on hazardous wastewaters regulated under the Clean Water Act. In general, the national database excludes wastes reported to the BRS that are regulated only by states. However, some variation in reporting practices across states may remain, especially regarding wastewaters managed in exempt units. Therefore, data on quantities generated may not be comparable for plants located in different states.

- Reported wastes can vary greatly in chemical composition, even when from the same source. The waste code "D008," for example, refers to wastes that contain lead above a certain concentration. The waste may be highly-dilute with low concentrations of lead, or a sludge with much higher lead content. Distinguishing wastes by physical form (e.g., aqueous versus non-aqueous) provides some insight into their different characteristics, but there is no way to assess variations in concentrations directly.

- The quantities of waste generated may represent continuing generation associated with vehicle assembly or a one-time event resulting in unusual quantities of waste. These events could include cleanup of a contaminated site or spill, or the dismantling of a plant or its equipment, for example. The Part III Plant-Community Profiles provide information on the source of wastes at each plant. Remediation wastes were not included in the analysis of changes between 1991 and 1993 reported below.

Summary of Data

<u>1993 Snapshot</u>

As noted above, states vary in their requirements for reporting RCRA hazardous wastewaters treated in exempt tanks and discharged under Clean Water Act provisions. Some states require that these wastewaters be reported as hazardous wastes in the Biennial Report, while others do not require that these wastes be included. This variation in reporting practices for these large quantity wastes overstates differences among assembly plants in the amount of hazardous waste generated. This section therefore distinguishes between aqueous and non-aqueous wastes, and calculates normalized quantities (per vehicle produced) based only on non-aqueous wastes.

A total of 191,199 tons of RCRA hazardous waste was reported as generated by assembly plants in 1993. Of this total, 129,361 tons (68 percent) was aqueous waste and 61,838 tons (32 percent) was non-aqueous waste.

The following two tables illustrate the distribution of 1993 waste quantities generated by source (e.g., cleaning/degreasing, surface preparation and finishing, and remediation derived waste) and physical form (liquids, solids, sludges - organic and inorganic). Table I-8 shows that surface preparation/finishing and cleaning/degreasing account for 56 percent of all assembly plant hazardous, non-aqueous waste and 87 percent of aqueous wastes. Similarly, two physical form categories account for the majority of hazardous waste. Table I-9 shows that 86 percent of hazardous waste generated by assembly plants is liquid waste (inorganic and organic, aqueous and non-aqueous).

Table I-8

RCRA HAZARDOUS WASTES GENERATED BY AUTOMOBILE AND LIGHT DUTY TRUCK ASSEMBLY PLANTS, 1993 BY SOURCE CATEGORY

Waste Source	Aqueous Wastes (tons)	Percent of Total Assembly Plant Aqueous Wastes	Non-Aqueous Wastes (tons)	Percent of Total Assembly Plant Non-Aqueous Wastes
Surface Preparation and Finishing	63,040	48.7	25,718	41.6
Cleaning and Degreasing	49,082	37.9	8,850	14.3
Processes Other Than Surface Preparation	0	0.0	5,240	8.5
Production or Service Derived One-Time and Intermittent Processes	388	0.3	3,003	4.9
Pollution Control or Waste Treatment Processes	115	0.1	3,104	5.0
Remediation Derived Waste	15	< 0.1	11	< 0.1
Other Processes/Source Not Reported	16,721	12.9	15,912	25.7
Totals - All Assembly Plants	**129,361**	**100.0**	**61,838**	**100.0**

Source: Part III profiles.

Table I-9

RCRA HAZARDOUS WASTES GENERATED BY AUTOMOBILE AND LIGHT DUTY TRUCK ASSEMBLY PLANTS, 1993 BY PHYSICAL FORM

Physical Form	Aqueous Wastes (tons)	Percent of Total Assembly Plant Aqueous Wastes	Non-Aqueous Wastes (tons)	Percent of Total Assembly Plant Non-Aqueous Wastes
Inorganic Liquids	129,361	100.0	29	< 0.1
Organic Liquids	0	0.0	34,141	55.2
Inorganic Solids	0	0.0	12,748	20.6
Inorganic Sludges	0	0.0	2,643	4.3
Organic Sludges	0	0.0	1,448	2.3
Organic Solids	0	0.0	1,131	1.8
Lab Packs	0	0.0	9	< 0.1
Form Not Reported	0	0.0	9,689	15.7
Total - All Assembly Plants	**129,361**	**100.0**	**61,838**	**100.0**

Source: Part III profiles.

As shown in Part II (page II-25) hazardous wastes exhibiting the toxicity characteristic for metals accounted for the largest quantities managed (66 percent of the total). Of these wastes, 89 percent were aqueous wastes either treated on-site or discharged to publicly owned treatment works (POTWs) for treatment. Another 10 percent of the toxic metal-bearing wastes were stabilized prior to disposal. Specific listed solvent wastes accounted for 18 percent of the total managed -- of which 62 percent was treated to recover solvents and another 14 percent was burned for energy recovery or used to produce fuels.

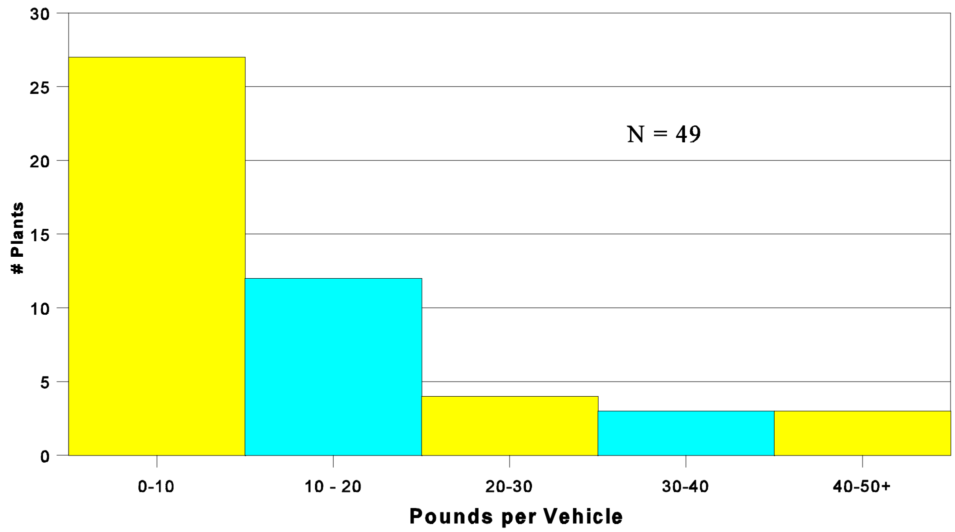
Most RCRA hazardous waste quantities managed in 1993 were treated on-site using aqueous treatment methods (59 percent), treated to recover solvents (14 percent), discharged to POTWs (9 percent) or stabilized prior to disposal (7 percent). Table I-10 shows the methods used to manage RCRA hazardous wastes generated by assembly plants in 1993.

Table I-10 RCRA HAZARDOUS WASTES MANAGED BY AUTOMOBILE AND LIGHT DUTY TRUCK ASSEMBLY PLANTS, 1993 BY MANAGEMENT METHOD				
Management System Type	**Aqueous Wastes (tons)**	**Percent of Total Assembly Plant Aqueous Wastes**	**Non-Aqueous Wastes (tons)**	**Percent of Total Assembly Plant Non-Aqueous Wastes**
Aqueous Treatment	110,847	85.8	1,231	2.0
Discharge to sewer/POTW	16,697	12.9	0	0.0
Solvents Recovery	115	0.1	26,994	43.8
Metals & Other Recovery	3	< 0.1	142	0.2
Stabilization	330	0.3	12,294	20.0
Fuel Blending	5	< 0.1	4,483	7.3
Incineration	53	< 0.1	3,220	5.2
Energy Recovery	3	< 0.1	1,965	3.2
Other Treatment	1,139	0.9	903	1.5
Landfill Disposal	0	0.0	2,904	4.7
Transfer Facility	1	< 0.1	185	0.3
Method Not Reported	0	0	7,259	11.8
Total - All Assembly Plants	**129,193**	**100.0**	**61,579**	**100.0**
Source: Part III profiles.				

Assembly plants vary widely in the quantity of non-aqueous RCRA hazardous waste generated per vehicle produced, as shown for 1993 in Figure I-5. (Remediation wastes are excluded from this calculation.) Non-aqueous waste quantities per vehicle produced ranged from 2.2 to 279.8 lbs., with an average for all assembly plants of 12.0 lbs. of waste per vehicle (and a average plant generation rate of 18.7 lbs. of waste per vehicle)[16].

[16] The first average is based on total assembly plant waste quantities and production for 53 plants for which BRS data are available. The "average plant generation rate" is the average of individual plant waste generation rates for 49 plants. The Lansing (#26 and 27) and Toledo (#48 and 49) plants were excluded from the latter calculation because of joint production may distort plant level averages per vehicle.

Figure I-5
DISTRIBUTION OF AUTOMOBILE AND LIGHT DUTY TRUCK ASSEMBLY PLANTS BY RCRA HAZARDOUS NON-AQUEOUS WASTE GENERATED PER VEHICLE PRODUCED, 1993



Source: Part III profiles. Excludes 10.9 tons of non-aqueous remediation wastes.

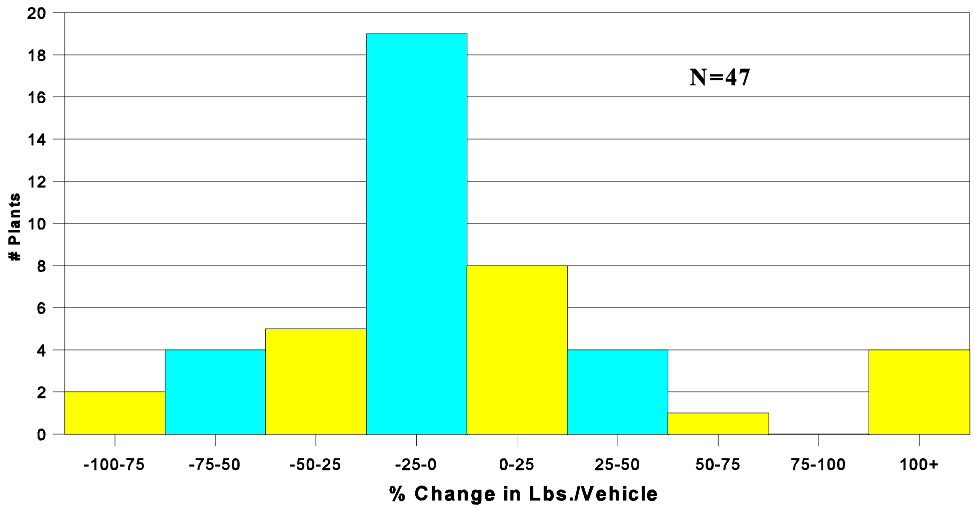
Hazardous Waste Changes 1991-1993

Changes in RCRA hazardous waste generation between 1991 and 1993 are affected by periodic generation of remediation wastes as well as by changes in waste generation from production activities. To focus on changes in production-related wastes on a consistent basis, this section excludes remediation wastes and aqueous wastes in calculating changes between 1991 and 1993 in total and per vehicle quantities generated.

The overall quantity of RCRA non-aqueous, non-remediation hazardous waste generated by assembly plants increased by 26 percent between 1991 and 1993. Twenty-eight plants generated more RCRA hazardous waste in 1993 than in 1991, and 23 plants either generated the same amount or reduced generation. BRS data are available for 53 plants, of which two were not in full operation in 1991 and therefore were excluded from calculations of changes between 1991 and 1993.

A comparison of non-aqueous, non-remediation waste per vehicle produced shows similar trends. The national average increased two percent (11.8 lbs. to 12.0 lbs.), and the average plant generation rate increased 7 percent (16.0 lbs. in 1991 to 18.7 lbs. in 1993). However, only 17 plants show an increase in non-aqueous waste per vehicle produced, while 30 plants reduced their waste per vehicle produced. Results normalized for production levels are shown in Figure I-6.

Figure I-6
DISTRIBUTION OF AUTOMOBILE AND LIGHT DUTY TRUCK ASSEMBLY PLANTS BY PERCENTAGE CHANGE IN RCRA HAZARDOUS NON-AQUEOUS WASTE GENERATED PER VEHICLE, 1991-1993



Source: Part II pp. II-12, II-16 and II-24. Excludes remediation wastes.

VOC and NOx Emissions Data

Description

The initial source reviewed for emissions data was the Aerometric Information Retrieval System (AIRS). AIRS is a national repository for air pollution data submitted by state and local agencies, as required under the Clean Air Act and EPA grant provisions and guidelines. The AIRS facility subsystem includes data on emissions from individual major sources (those with the potential to emit more than 100 tons per year of any criteria pollutant other than lead or CO, for which the limits are 5 tons a year or 1,000 tons a year, respectively). The data represent actual emissions (as opposed to potential or allowable).[17] The facility subsystem also contains regulatory compliance and permit tracking data. Some but not all data in AIRS are available to the public.

---

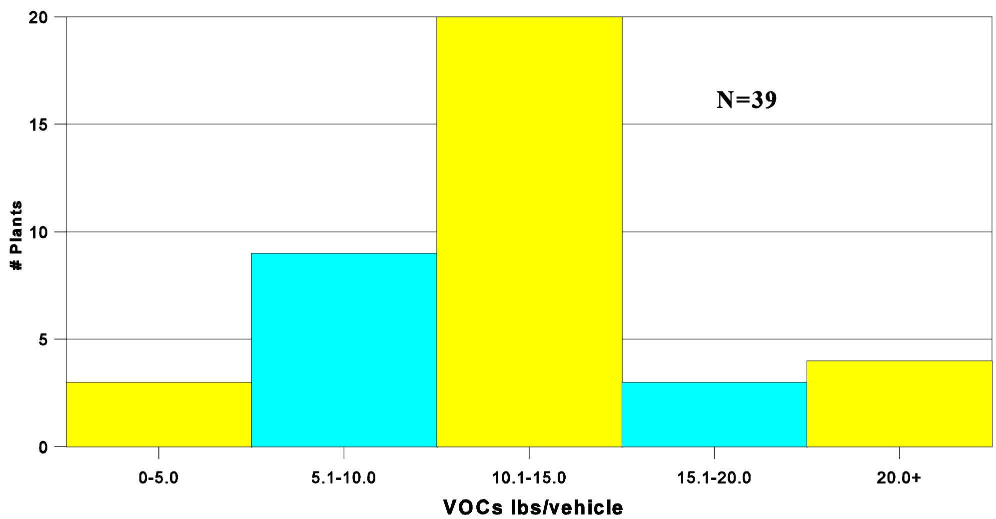
[17] The criteria air pollutants are PM_{10}, NO_2, O_3, CO, SO_2 and lead (Pb).

The AIRS data were found to be incomplete and outdated in many instances, and had to be supplemented by requesting data from state agencies and the companies. The data reported in this section are those obtained from state offices and the companies. The data represent actual or estimated emissions, rather than allowable emissions. The methods used to calculate emissions vary. In some cases, facilities reported emissions themselves, while in other cases state agencies calculated emissions based on production levels reported by the facilities and estimated emission factors.

Summary of Data

Figure I-7 shows the distribution of assembly plants by pounds of VOCs emitted per vehicle produced in 1994. This distribution includes the 45 plants for which 1994 VOC emissions data were available.[18] The measures used to report emissions vary from state to state. The per vehicle comparison in Figure I-7 includes only plants reporting volatile organic compounds (VOCs), and not other measures such as volatile organic materials (VOMs). There may be other inconsistencies in state reporting requirements that limit the reliability of comparisons across plants.

Figure I-7
DISTRIBUTION OF AUTOMOBILE AND LIGHT DUTY TRUCK ASSEMBLY PLANTS BY VOC EMISSIONS PER VEHICLE PRODUCED, 1994

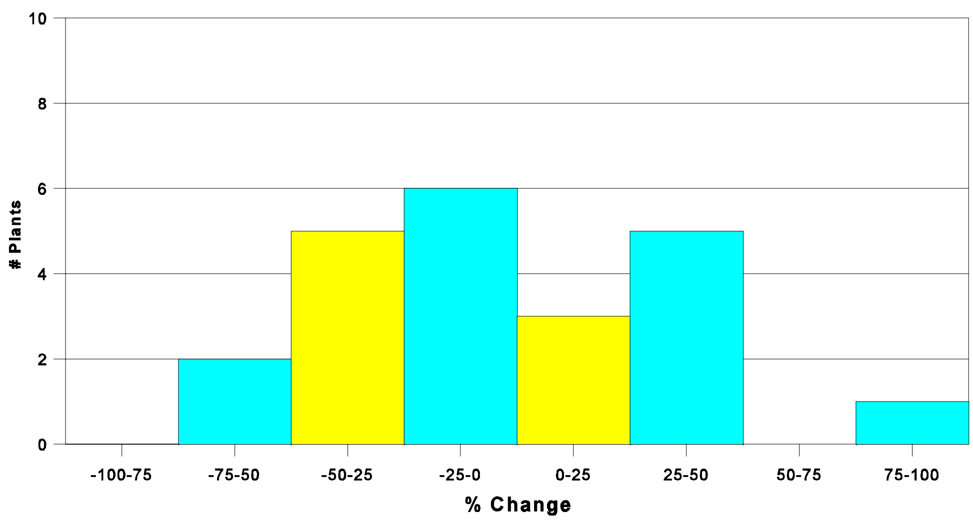


Source: Part II p. II-1 and II-20.

[18] All comparisons of VOCs and NOx emissions per vehicle produced exclude the two Lansing and two Toledo plants which share production operations. One plant which was not operating in 1994 is also excluded.

Of the 31 plants for which data are available for both 1990 and 1994, VOC or VOM emissions increased at 18 plants and decreased at 13 plants over that time period. Figure I-8 shows the distribution of assembly plants by the percentage change in VOCs or VOMS emitted per vehicle between 1991 and 1994. Data on VOC or VOM emissions for both 1991 and 1994 were available only for 22 plants.[19] Of the 22 plants, all but nine reduced the level of VOCs/VOMs emitted per vehicle between 1991 and 1994 -- with two reducing per vehicle VOC/VOM emissions by more than 50 percent.

Figure I-8
DISTRIBUTION OF AUTOMOBILE AND LIGHT DUTY TRUCK ASSEMBLY PLANTS BY PERCENTAGE CHANGE IN VOC EMISSIONS PER VEHICLE PRODUCED, 1991-1994



Source: Part II p. 20, II-12, II-18 and II-20.

Similarly, for the 29 plants for which data are available for both 1990 and 1994, NOx or NO_2 emissions increased at 19 plants and decreased at 10 plants over that time period. On a per vehicle basis, NOx or NO_2 emissions increased at 14 plants, decreased at eight plants, and remained the same at two plants between 1991 and 1994. (Lack of 1991 NOx/NO2 data made this comparison possible only for 24 plants.)

[19] Data for two plants were excluded because they were not fully operational in the years in question.

Table I-11 compares 1994 VOC emissions for plants in locations with different ozone attainment status in 1994. The average emissions per plant and per vehicle produced show relatively small variations across attainment status categories, when compared with the substantial variation in these averages within the attainment status categories.

Table I-11

VOC EMISSIONS FROM AUTOMOBILE AND LIGHT DUTY TRUCK ASSEMBLY PLANTS BY OZONE ATTAINMENT STATUS, 1994

	Attainment	Maintenance/ Transitional	Nonattainment (marginal/ moderate)	Nonattainment (serious/severe)	TOTAL
No. Assembly Plants	16	3	28	9	56
No. with 1994 VOC Data Available	8	3	20	8	39
Total 1994 VOC Emissions (lbs.)	20,406,948	8,598,488	51,817,300	17,198,800	
Average 1994 VOC Emissions per Plant (lbs.)	2,550,869 *(835,160-5,214,000)*	2,866,163 *(2,122,000-3,479,218)*	2,590,865 *(16,122-4,454,164)*	2,149,850 *(1,407,860-3,382,000)*	
Average 1994 VOC Emissions per Vehicle Produced (lbs.)	14.9 *(4.0-42.0)*	16.3 *(12.9-20.7)*	11.1 *(0.5-22.2)*	11.5 *(8.8-16.9)*	

Source: Part II p. II-20 and II-22.

Releases to Surface Waters and POTWs

Data from the Permit Compliance System (PCS) suggest that 24 of the 56 plants have or have had NPDES permits for discharges to surface waters. The companies noted that the majority of these permits were for stormwater discharges, rather than for discharge of process wastewaters. In some cases, these permits may no longer be in effect, since some PCS records show permit expiration dates that have passed. Alternatively, permit renewals may be pending. The PCS database does not report the status of each permit. TRI data reported in Part II suggest that there has been a decrease between 1991 and 1994 in discharges to surface waters, at least of the chemicals reported in TRI. In 1991, 16 assembly plants discharged 53,566 lbs. of TRI chemicals to surface waters. In 1994, six plants reported discharges of 9,862 lbs. of TRI chemicals to surface waters.

Ambient Air Quality Attainment Status

Of the 56 plants, 40 were located in areas that were not in attainment with the National Ambient Air Quality Standard (NAAQS) for ozone as of 1994. (See Page II-10.) Of these, two were in a serious nonattainment area, seven were in severe nonattainment areas, and 25 were in moderate nonattainment areas. Another three plants were in marginal areas, two were in transitional areas, and one plant was in a maintenance area. Sixteen assembly plants are located in areas that were in attainment with the ozone standard or were not classified.[20] Of the plants located in nonattainment areas in 1994, 20 are located in areas that had been upgraded to an attainment classification for ozone by 1996, however.

Community Economic and Demographic Data

Description

The work group obtained community economic and demographic data from U.S. Census sources. Data were collected at the county levels, for census blocks, and for fixed areas around each plant (e.g., a circle of 3-mile radius centered on the plant).

Counties are the most readily-available reporting unit, but they vary greatly in size and shape. Depending on the size of the county and the plant's location within it (in its center or at a county boundary), county-level data will be more or less reliable in representing the characteristics of the area around a plant.[21]

Area-wide averages for demographic characteristics at any level of reporting may be misleading, depending on the specific location of a plant. For example, a plant located next to a major airport in a downtown area may appear to be located in a rural area based solely on the population density of a three-mile radius circle around the plant. This document, therefore, uses a variety of data types in combination with maps to provide a more reliable picture of assembly plant community characteristics.

Caution should be used when interpreting the demographic and economic data. In particular, data should not be assumed to reflect direct cause-and-effect relationships. Employment statistics, community resources and general social well-being in a local area may be influenced by a plant's operations and economic performance, but they reflect a host of other economic and political forces as well, both national and local.

---

[20] See Appendix H for definitions of the attainment categories.

[21] Counties where assembly plants are located range from 103 to 1,184 sq. miles in area. (Baltimore MD is an independent city covering 81 sq. miles. Norfolk VA is an independent city covering 54 sq. miles.) As a basis for comparison, a one-mile radius circle around the plant encompasses a little more than three square miles, and a three-mile radius circle includes 28 square miles.

Summary of Data

Fifty-one of the 56 plants are located in Metropolitan Statistical Areas (MSAs).[22] At the county level, average 1994 county population densities (population per square mile of land area) for the 56 plants range from 81 (for the Honda plant in Marysville OH) to 5,436 (Chicago, location of a Ford plant). Average 1990 population densities (population per square mile of land area) within a three mile radius of the plant range from 35 (for the Honda plant in Marysville OH) to 38,351 (for a General Motors plant in Lansing MI). (See Figure I-9)

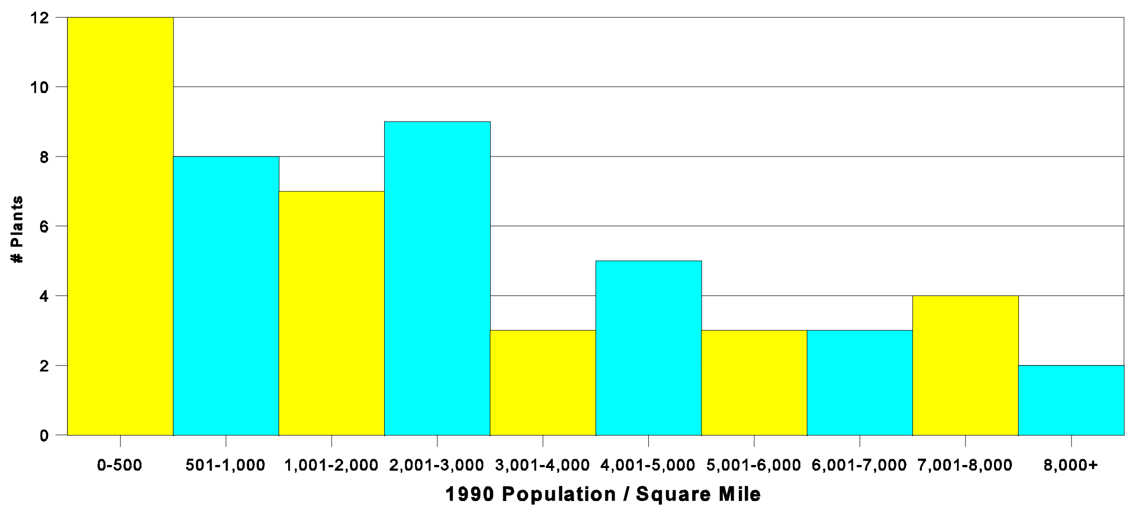
Assembly plants represent a significant portion of local manufacturing employment in some assembly plant communities. Of the 40 counties where assembly plants are located, the plants accounted for ten percent or more of total county manufacturing employment in 25 of the counties, and for 25 percent or more in 13 of the counties.[23] The contribution of individual assembly plants to local manufacturing employment varies widely, from less than one percent (for Ford's plant in Chicago) to approximately 99 percent (for Toyota in Georgetown KY), reflecting the varied sizes and economic characteristics of assembly plant communities.

Most assembly plant communities enjoy lower civilian unemployment rates than the nation as a whole: 39 of the 56 assembly plants are located in counties with unemployment less than the 1994 national average of 6.1 percent.

[22] Metropolitan Statistical Areas (MSAs) (formerly known as SMSAs) are geographic units defined by the Census Bureau to include large Central Cities together with their surrounding "socially and economically integrated" county or counties. MSAs include whole counties and may cross state boundaries.

[23] Employment data were not available for three assembly plants.

Figure I-9
DISTRIBUTION OF AUTOMOBILE AND LIGHT DUTY TRUCK ASSEMBLY PLANTS BY POPULATION DENSITY IN 3-MILE RADIUS



Considering just the three-mile area surrounding the plants (based on 1990 Census data):

- The 3-mile area surrounding 31 assembly plants had minority population percentages lower than the average for their state, and the areas surrounding 35 plants had minority population percentages lower than the national average of 19.7 percent.

- The 3-mile area surrounding 39 assembly plants had percentages of residents living below the poverty line that were lower than the average poverty rate for their state, and the areas around 37 plants had poverty rates below the national average of 20 percent.

- The 3-mile areas surrounding 33 assembly plants had high school completion rates higher than the average completion rate in their state, and 33 had high school completion rates higher than the national average of 25 percent.

Data on other demographic characteristics of assembly plant communities were collected only at the county level. The county-level data show that:

- Thirty-one assembly plants are in counties that had a percentage of their population under the age of five that was equal to or less than the 1990 national average, and 25 assembly plants are located in counties with higher proportions of their population under age five than the 1990 national average.

- Forty assembly plants are in counties that had an elderly percentage (over 75 years old) equal to or lower than the 1990 national average, and 16 assembly plants are in counties that had a higher-than-average elderly percent.

- Median household income in 1989 exceeded the national average in 24 of the counties where assembly plants are located and was below the national average in 16 of the assembly plant counties.